Please cancel, without prejudice, claims 1 to 21.

Please add new claims 22 to 61 as follow:

22. A system for process control in a combustion application, comprising:

a) a tunable diode laser for generating a frequency modulated near-infrared laser beam;

b) transmitting means for transmitting the near-infrared laser beam through off-gas produced by the combustion application;

c) detecting means for detecting the transmitted laser beam;

d) controller means for analyzing the detected laser beam for select CO and H_2O absorption lines to determine CO concentration, and for producing an electrical signal in response to CO concentration; and

e) a control system for providing adjustment of select inputs to the combustion application in response to the electrical signal from the controller means.

23. A system according to claim 22 wherein the controller comprises means for providing predetermined calibration curves to determine CO concentration.

24. A system according to claim 23 wherein the calibration curve is CO concentration as a function of CO absorption lines and temperature.

25. A system according to claim 24 wherein the controller determines the temperature of the off-gas from analysis of the H_2O absorption lines.

26. A method according to claim 25 wherein the H_20 absorption lines targeted respond differentially to changes in temperature.

27. A system according to claim 25 wherein the temperature of the off-gas is determined from the ratio of two H_2O absorption lines.

28. A system according to claim 22 wherein the CO absorption lines targeted have a profile of strong lines as compared to H_2O.

29. A system according to claim 22 wherein the CO absorption line is located at 1577.96 nm, and the H_2O absorption lines are located at 1577.8 nm and 1578.1 nm.

30. A system according to claim 22 wherein the laser generates a laser beam having a wavelength in the range of about 0.7μm to about 3.0 μm.

31. A system according to claim 22 wherein the laser generates a laser beam having a wavelength in the range of about 1.5 μm to about 1.7 μm.

32. A system according to claim 22 wherein the laser is a distributed feedback laser.

33. A system according to claim 32 wherein the laser generates a laser beam having a wavelength in the range of about 1.57 μm to about 1.59 μm.

34. A system according to claim 22 wherein the frequency modulation is operated at MHz frequencies.

35. A system according to claim 22 wherein the select inputs to the combustion application comprise oxygen.

36. A system according to claim 22 wherein the select inputs to the combustion application comprise fuel.

37. A system according to claim 22 wherein the select inputs to the combustion application comprise electric power.

38. A system according to claim 35 wherein the select inputs to the combustion application comprise fuel.

39. A system according to claim 35 wherein the select inputs to the combustion application comprise electric power.

40. A system according to claim 36 wherein the select inputs to the combustion application comprise electric power.

41. A system according to claim 38 wherein the select inputs to the combustion application comprise electric power.

42. A method for process control in a combustion application, comprising:

a) transmitting a frequency modulated near-infrared laser beam through off-gas produced by the combustion application to target CO and H_2O;

b) detecting the transmitted laser beam;

c) analyzing the detected laser beam for select CO and H_2O absorption lines;

d) determining the CO concentration from the CO and H_2O absorption lines;

e) adjusting select inputs of the combustion application in response to the CO concentration.

43. A method according to claim 42 wherein CO concentration is determined using predetermined calibration curves.

44. A method according to claim 43 wherein the calibration curve is CO concentration as a function of CO absorption lines and temperature.

45. A method according to claim 44 wherein the H_2O absorption lines are used to determine the temperature of the off-gas

46. A method according to claim 45 wherein the targeted H_20 has absorption lines that respond differentially to changes in temperature.

47. A method according to claim 45 wherein the temperature of the off-gas is determined from the ratio of two H_2O absorption lines;

48. A method according to claim 42 wherein the targeted CO has a profile of strong absorption lines as compared to H_20.

49. A method according to claim 42 wherein the CO absorption line is located at 1577.96 nm, and the H_2O absorption lines are located at 1577.8 nm and 1578.1 nm.

50. A method according to claim 42 wherein the wavelength of the laser beam is in the range of about 0.7μm to about 3.0 μm.

51. A method according to claim 42 wherein the near-infrared laser beam is transmitted by a tunable diode laser.

52. A method according to claim 51 wherein the wavelength of the laser beam is in the range of about 1.5 μm to about 1.7 μm.

53. A method according to claim 42 wherein the near-infrared laser beam is transmitted by a distributed feedback laser.

54. A method according to claim 53 wherein the wavelength of the laser beam is in the range of about 1.57 μm to about 1.59 μm.

55. A method according to claim 42 wherein the select inputs to the combustion application comprise oxygen.

56. A method according to claim 42 wherein the select inputs to the combustion application comprise fuel.

57. A method according to claim 42 wherein the select inputs to the combustion application comprise electric power.

58. A method according to claim 55 wherein the select inputs to the combustion application comprise fuel.

59. A method according to claim 55 wherein the select inputs to the combustion application comprise electric power.

60. A method according to claim 56 wherein the select inputs to the combustion application comprise electric power.

61. A method according to claim 58 wherein the select inputs to the combustion application comprise electric power.